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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/086,155	02/26/2002	Masaaki Katoh	259052002900	2654

7590 01/05/2005
Thomas E. Ciotti
Morrison & Foerster LLP
755 Page Mill Rd.
Palo Alto, CA 94304-1018

EXAMINER

HU, SHOUXIANG

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 01/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/086,155	KATOH, MASA AKI	
	Examiner	Art Unit	
	Shouxiang Hu	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-11,13,14,17-20 and 23-27 is/are pending in the application.
- 4a) Of the above claim(s) 11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-10,13,14,17-20 and 23-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Claim 11 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 5. Accordingly, claims 1, 2, 5-11, 13-14, 17-20 and 23-27 are pending in this application; and claims 1, 2, 5-10, 13-14, 17-20 and 23-27 remain active in this Office action.

Drawings

2. The corrected drawings were received on 4-28-04. These drawings are approved.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1, 2, 5-10, 13-14, 17-20 and 23-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites the subject matters that the recited "one side of the transparent substrate" is "opposite to the direction of light deflected by the light reflecting layer"; but its fails to clarify definitely which side of the transparent substrate it refers to, since a side itself is hardly

comparable to a direction without further defining a line along which the side (surface) is connected to or pointed to. For example, it may make it definite to define that the direction of a shortest line from (or, pointing to) the "one side of the transparent substrate" to (or, from) the other side of the transparent substrate is "opposite to the direction of light deflected by the light reflecting layer

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-2, 5-6, 8, 10, 13-14, 17-18, 20, 23, 24 and 26, insofar as being in compliance with 35 U.S.C. 112 and as being best understood in view of the claim objections above, are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al. ("Chu"; US 2002/0117672 A1) in view of Okazaki (US 5,670,797; of record) and/or Ishizaki (US 2004/0051109).

Chu discloses a light-emitting diode (LED) comprising a LED chip (Figs. 1-6; especially Figs. 1B and 2), including: a transparent substrate (201); a semiconductor layer (202-204) laminated on the top surface of the substrate and formed of an N-type semiconductor layer and a P-type semiconductor layer, wherein at least a portion in the vicinity of the PN junction interface is rendered to be a light-emitting portion; a light reflecting layer (205; Ni or Au, having a thickness range covering 100 nm) for reflecting

light emitted from the light-emitting portion; and a pair of electrodes ("P-pad" and 206) on top surfaces of the semiconductor layer, wherein the direction of a shortest line pointing from the top surface of the transparent substrate to the bottom side of the transparent substrate is opposite to the direction of light deflected by the light reflecting layer.

Although Chu does not expressly disclose that the LED chip can be vertically mounted on a printed substrate with its PN junction interface being perpendicular to the surface of the printed substrate, Okazaki teaches that such a vertically mounted LED chip is desirable for high reliability and easy mass production (see the vertical LED chip 44 in Fig. 8 (b); also see the abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the vertical LED mounting structure of Okazaki into the LED of Chu, so that a LED with high reliability and easy for mass-production would be obtained.

Regarding claim 2, Chu further teaches (Fig. 1B) that the emitted light from the LED can also be extracted through the transparent substrate (107) on a top side of the semiconductor layer (in LED) with a reflecting layer (110) formed of a thick conductive layer on the bottom side of the semiconductor layer (in LED).

Although Chu does not expressly disclose that the reflective conductive layer (110) can be formed of a metal, one of ordinary skill in the art would readily recognize that a metal reflective layer can be desirably formed for improving the optical efficiency and output of the light-emitting device, as readily evidenced in the prior art such as

Ishizaki (see the meta reflective layer 22 in the cover page figure); and that Ni is a common reflective layer in the art, as evidenced in Chu as already discussed above.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the vertical LED mounting structure of Okazaki into the LED of Chu (Fig. 1B) with the thick conductive layer (110) therein being formed of a metal such as Ni, per the teachings or further teachings of Ishizaki and/or Chu, so that a LED with high reliability and easy for mass-production along with enhanced optical efficiency and output would be obtained.

Regarding claims 6, 8, 13-14, 17 and 18, it is noted that Ni is an art-known common material for forming a reflective layer; and that the thickness of the reflective layer is art-recognized parameters of importance subject to routine experimentation and optimization.

7. Claims 7, 9, 19, 25 and 27, insofar as being in compliance with 35 U.S.C. 112 as being best understood in view of the claim rejections above, are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu in view of Okazaki, as applied to claims 1-2, 5-6, 8, 10, 13-14, 17-18, 20, 23, 24 and 26 above, and further in view of Morita et al. ("Morita"; US 6,121,636).

The disclosure of Chu and Okazaki are disclosed as applied to claims 1-2, 5-6, 8, 10, 13-14, 17-18, 20, 23, 24 and 26 above.

Although Chu and Okazaki do not expressly disclose that a dielectric thin film can be formed between the substrate and the metal thin film, it is art known that a thin SiO₂

film can be desirably formed between the substrate and the metal thin film for smoothing the interface therebetween, as evidenced in Murita (see col. 5, lines 14-29).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the smoothing dielectric thin film of Morita into the LED collectively taught by Chu and Okazaki, so that a LED with smooth reflective metal thin film would be obtained.

Regarding claims 9 and 27, Chu further teaches that the Au film can have a thickness range covering the recited thickness of the instant invention. And, it is noted that the recited thickness for the smoothing dielectric thin film is well within or overlap with the art-recognized normal thickness for a smoothing dielectric thin film; and that the exact thickness of a smoothing dielectric thin film is an art-recognized parameter of importance subject to routine experimentation and optimization.

Response to Arguments

8. Applicant's arguments filed on 10-23-04 have been fully considered but they are not persuasive. Examiner's responses to these arguments have been incorporated into the claim rejections above.

In addition, in response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one

Art Unit: 2811

of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the benefits identified above from combining the teachings of the recited references are obvious to the ordinary skill in the art; and nothing in these references discourages such combining. It is art known that input terminals (electrodes) of a LED can be readily connected to a mounting substrate. And, applicant's arguments fail to prove what specific type of connections in the collectively taught device would be out of the ordinary. Furthermore, any specific process limitations potentially implicated in the making of the collectively taught device above would be regarded as process limitations, which would not carry patentable weight in the claim drawing to a structure, because distinct structure is not necessarily produced. In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-1654. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 6:00 PM.

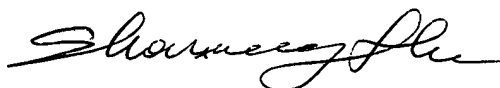
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2811

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SH

December 28, 2004

A handwritten signature in black ink, appearing to read 'Shouxiang Hu', written in a cursive style.

SHOUXIANG HU
PRIMARY EXAMINER